Phase 1 Field Sampling Plan Supplemental Remedial Investigation CPS/Madison Superfund Site Old Bridge Township, Middlesex County

SUBMITTED BY





SUBMITTED TO



United States Environmental Protection Agency

PREPARED BY

Ciba Specialty Chemicals Corporate Remediation Toms River, New Jersey May 2007



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1.0 Introduction

In February 2007 Ciba submitted a Supplemental Remedial Investigation Work Plan for the CPS/Madison Superfund Site to USEPA. As a follow up deliverable, this Phase 1 Field Sampling Plan has been prepared to address the specific tasks discussed in Section 7.1 of the previously submitted Supplemental RI Work Plan.

This field sampling plan presents the specific sample locations and analytical parameters that will satisfy the requirements for completing Phase 1 of the Supplemental Remedial Investigation. The field work will be performed pursuant to the Quality Assurance Project Plan (QAPP) and the Health and Safety Plan that were submitted as Appendix A and Appendix B, respectively, to the Supplemental Remedial Investigation Work Plan.

A searchable database for GIS visualization and data quality control has been developed which includes all usable site data collected through all previous phases of investigation activities.

This first Phase focuses on near-field VOC, SVOC, and metals characterization [i.e., characterize contaminant mass source conditions and the mass flux emanating from the CPS/Madison Site], and an assessment of the effectiveness of the CPS interim pump-and-treat remedy which is intended to control offsite VOC migration until a site remedy is identified and implemented. Efficient and effective data collection methods will be employed using push technology for rapid data collection [groundwater, soil, geophysics]. If necessary, installation of permanent monitoring points for time-trend analysis will follow based on an evaluation these data.

If this additional characterization effort shows that control of mass flux migration by the interim pump and treat system is incomplete, Ciba intends to implement an immediate corrective action to reestablish control, the details of which will be based on the data collected and discussions with the EPA and NJDEP.

Figure 1 shows the layout of the site and the Areas of Concern identified in the original Remedial Investigation that was submitted to NJDEP.

2.0 Objectives

This Phase 1 of the Supplemental RI will address the following data gaps identified in the February 2007 Supplemental RI Work Plan.

- 1. Mass flux entering the CPS Site. The proposed sampling program (with subsequent installation of new wells if required to monitor the mass flux entering the CPS site over time) will be used to further define the VOC mass flux entering the CPS Site from the Evor Phillips site [EPLC]. This sampling program will resolve plume width and plume core geometry in more detail.
- 2. Source location and composition. While the general location of the CPS source area is well defined, the horizontal and vertical extent of the source zone should be further resolved. The sample locations identified in this plan will be used to complement the existing database and resolve the boundaries. The source area is characterized by a mixture of VOCs, and the existing database is made up of mostly VOC analyses. Only a limited amount of SVOC and metals data have been collected in the source area to date, and additional data will be collected to support the update to the Human Health Risk Assessment.
- 3. Mass flux emanating from the CPS/Madison Site. The proposed sampling program will define the nature and extent of groundwater VOC contamination emanating from the Site including: plume edges [top, bottom and sides] and plume core geometry. Plume core delineation will be used to site permanent monitoring locations to record the mass flux emanating from the CPS Site over time.
 - a) Near field mass flux will be evaluated by correlation of source mass in soils and dissolved mass.
 - b) Data will be collected to assess time trends of contaminant composition, to update the baseline risk assessment, and provide additional information for the evaluation of potential remedial alternatives.
 - 4. <u>Effectiveness of the existing pump-and-treat systems and monitoring regime</u>. This effort will be undertaken after the data collected during the Phase 1 field work has been analyzed.

The focus for Phase 1 will be on characterizing the nature and extent of VOC, SVOC, and metals soil and groundwater contamination in the vicinity of the CPS Site. The following four tasks [Section 2.1 through Section 2.4] are included in this Phase 1 Field Sampling Plan to address the above issues.

Although updating the Baseline Human Health Risk Assessment for the site will be part of Phase 2 of the Supplemental RI effort, data to support this effort will be collected during these Phase 1 activities.

2.1 Update and complete a groundwater and soil database for the site

The site database has been compiled into a usable format for future work. This database includes the original Remedial Investigation data and subsequent data collected through to the present. All location information for analytical samples are in New Jersey State Plane coordinates [NAD 1983].

2.2 Perform an existing well survey

A total of 203 monitoring wells were identified across the CPS, Madison and upgradient Evor Phillips properties. These wells were grouped by their screened intervals into three horizons in order to assess their utility in providing monitoring points in the proposed groundwater transects. The locations of the existing monitoring wells have been evaluated for use as sampling points for upgradient and downgradient groundwater transects. Because the condition of some of the existing monitoring wells that are not included in the biannual sampling program are questionable and these wells may require redevelopment prior to sampling, the groundwater transect sampling plan will not incorporate sampling of existing wells. The sampling program will instead rely on new data collected by geoprobe transects.

2.3 Groundwater and Soil Profile Sampling

Direct push methods will be used to gather additional site data to refine the understanding of the contaminant distribution in the soil and groundwater in the source area and the near field upgradient and downgradient zones.

2.3.1 Soil Sampling

Sampling of soils in the source area will include analysis for VOC and SVOC compounds, with an additional subset of soils from the CPS source area analyzed for metals. A minimum of 20 samples will be collected for SVOC and metals. In addition, the analysis for a number of samples will include complete GCMS library search to assess the frequency of detection and magnitude of any TICs in support of the Human Health Risk Assessment update. The additional metals analysis will also be used to confirm that the CPS source area is not contributing to the downgradient Madison metals plume. Figure 2 shows the proposed sample locations for the CPS source area sampling. Included in the figure are the locations of previous soil borings advanced in the source area.

An additional number of soil samples will be collected on the CPS site side-gradient and upgradient of the source area to support an interim land use plan [Figure 10].

2.3.2 Groundwater Sampling

Groundwater sampling will be conducted in direct push borings across two proposed transects at the site, one upgradient of the CPS source area and one downgradient, as shown in **Figure 3**. After analysis of the groundwater profiling data is completed, any necessary new permanent monitoring locations will be identified and installed. It is envisioned that the upgraded monitoring network will be sufficient to assess contaminant mass flux entering and leaving the site. These new permanent sampling locations will be added to the existing monitoring network for time-trend analysis.

2.4 Assess the effectiveness of the interim pump-and-treat remedial action

If (after review of the data collected in this effort) modifications to the interim pump and treat remedy are deemed necessary to meet the original intent, these will be proposed. The interim remedy was put in place to ensure protectiveness of the groundwater resource downgradient of the CPS Site until a final source area remedy is defined and implemented.

3.0 Field Sampling Plan

The focus of this Field Sampling Plan is the groundwater and soil sampling, to address Objective 2.3 in the previous Section. Objective 2.1 [database compilation] and Objective 2.2 [well survey] have been completed and were used to define the sample locations for soil and groundwater in this Plan.

Following the data collection efforts detailed in this Plan, the effectiveness of the interim pump and treat system will be evaluated [Objective 2.4] and these findings will be included in the Phase 1 Supplemental Remedial Investigation Report.

Analytical data quality objectives, sample preservation, and analytical methods are detailed in Appendix A [QAPP] of the February 2007 Supplemental Remedial Investigation Work Plan. This previously submitted plan also includes requirements for the frequency of submitting duplicates and sample blanks to accompany the soil and groundwater samples collected during this Phase 1 effort. Laboratory QC protocols are also included in the previously submitted QAPP. Requirements for project documents and records, such as field notes, are also detailed in the QAPP.

The soil sampling locations identified in this plan will be used to further refine the limits of contamination within the former tank farm [AOC 5] source area, particularly with respect to depths below 8 feet, where many previous borings were terminated. Additional locations around this area will further define the source contamination limits near the Site boundaries to the south and to the east. The previous data show that maximum measured concentrations for most contaminants in this area were above the groundwater table.

Groundwater sampling in this Phase 1 effort is focused on defining the impact of upgradient sources and also further defining the 3-dimensional geometry of the plume emanating from the CPS source area. The two proposed groundwater transects in this Plan [Figure 3] have been placed at specific locations to address these requirements. Direct push methods will be used [to install sampling equipment to depth] to collect groundwater samples at specific intervals. In the event that a direct push sampler cannot reach the desired depths [to 50 feet below ground surface] at some locations, a drill rig will be used for any deep sampling locations not completed by geoprobe. During previous work at the site geoprobe sampling was successful to depths in excess of 90 feet, so problems reaching the desired sampling depths are not anticipated.

In addition, a number of shallow soil samples will be collected in the CPS property in support of ongoing site use and to eliminate this area from further evaluation.

3.1 CPS Source Area

A total of 250 soil samples [75 locations with multiple samples in the vertical] have been used to define the CPS source area [5 Areas of Concern, as shown in Figure 1]. The 250 sample data set includes results from the 1994 RI through data collected in 2004. Based on the data collected to date, the deepest contamination in the source area appears to be beneath the former tank farm area [AOC 5]. Significant contamination does not appear to extend beyond depths of 20 feet below the surface in the source area. Sampling in Phase 1 will focus on confirmation of the contaminant distribution in the source are as well as sampling the periphery of the source area.

3.1.1 Soil Sampling

Soil sampling locations for VOC, SVOC, and metals analysis are shown in Figure 2. The SVOC analysis will include library searches to estimate Tentatively Identified Compound [TICs] impacts as part of the update to the Human Health Risk Assessment for the Site. The location data for the soil sampling in and around the CPS source area are listed in Table 1.

Soil sampling using direct push coring at the locations shown in Figure 2 will be advanced to a depth of 24 feet below the ground surface. Field screening of the soil cores will be recorded at two foot intervals, with a minimum of three samples collected at each location for laboratory analysis. Laboratory samples will be collected to target the following:

- An interval above the water table that has a high screening value [if no high readings are observed at a location then one sample will still be collected above the water table];
- the depth of the top of the water table; and,
- one sample below the water table where screening indicates low or non-detect levels.

Table 1 shows that at all sample locations (57 total) VOC analysis using Method SW-8260 will be performed. In addition, at seven locations (21 total samples) samples will be analyzed both by Method SW-8270 with full library search and analysis for the 8 RCRA metals. The samples for 8270 and metals analyses include locations upgradient, within, and downgradient of the CPS source area.

Table 1
Soil Sampling locations for the CPS Source Area
(Three samples to be collected per boring location)

Location ID	NJSP X Coordinate, NAD83, US survey feet	NJSP Y Coordinate, NAD83, US survey feet	Targeted Sample Depths	Analytical Paramters
SBN01	540070.71	582858.98	I VZ, I TWT; I SZ	VOC, SVOC (TICs), Metals
SBN02	540172.39	582839.24	1 VZ, 1 TWT; 1 SZ	VOC
SBN03	540273.03	582841.72	1 VZ, 1 TWT; 1 SZ	VOC
SBN04	540408.46	582898.87	1 VZ, 1 TWT; 1 SZ	VOC, SVOC (TICs), Metals
SBN06	540437.04	583187.13	1 VZ, 1 TWT; 1 SZ	VOC
SBN05	540453.19	582946.09	1 VZ, 1 TWT; 1 SZ	VOC
SBN07	540404.73	583289.01	1 VZ, 1 TWT; 1 SZ	VOC
SBN08	540373.67	583346.16	1 VZ, 1 TWT; 1 SZ	VOC
SBN09	540300.37	583334.98	1 VZ, 1 TWT; 1 SZ	VOC
SBN10	540166.18	583318.83	1 VZ, 1 TWT; 1 SZ	VOC
SBN11	540057.52	583126.40	1 VZ, 1 TWT; 1 SZ	VOC
SBN12	540069.03	582920.01	1 VZ, 1 TWT; 1 SZ	VOC, SVOC (TICs), Metals
SBN13	540061.76	583047.14	1 VZ, 1 TWT; 1 SZ	VOC, SVOC (TICs), Metals
SBN14	540066.12	582984.01	1 VZ, 1 TWT; 1 SZ	VOC
SBN15	540315.33	583138.50	1 VZ, 1 TWT; 1 SZ	VOC
SBN16	540115.73	582997.98	1 VZ, 1 TWT; 1 SZ	VOC, SVOC (TICs), Metals
SBN17	540229.55	582888.93	1 VZ, 1 TWT; 1 SZ	VOC
SBN18	540176.12	583028.09	I VZ, I TWT; 1 SZ	VOC, SVOC (TICs), Metals
SBN19	540244.45	582997.03	1 VZ, 1 TWT; 1 SZ	VOC, SVOC (TICs), Metals

VZ - Vadose Zone Sample

TWT - Sample at the Top of the Water Table

SZ - Saturated Zone Sample

3.2 Upgradient Groundwater Transect

To complete the understanding of the mass flux from the ELPC site, Ciba will use existing data where possible and use additional Geoprobe sampling locations to fill in data gaps. In 1999 and 2003 EPLC installed thirteen [13] Geoprobe locations between the two sites, and in 2004 Ciba installed four [4] Geoprobe locations between sites. Figure 4 shows the locations, installation date and total depth BGS from which samples were collected. In addition to these data, information from EPLC source area, groundwater flow analysis, and comprehensive water quality data from existing monitoring wells and Geoprobe locations were used to map the contaminant plume emanating from the EPLC Site [Ciba 2006]. Figure 5 shows the interpreted 1,2-Dichloroethane distribution in groundwater, which is indicative of the extent of EPLC groundwater impact.

Figure 6 shows the proposed locations for the six new Geoprobe sampling locations and the depths below ground surface from which groundwater samples will be collected.

The direct push sampling locations in the upgradient zone shown in Figure 6 and are spaced at approximately 70 foot intervals across the transect. These six locations were selected based on the existing data to fill the data gaps and achieve the objective. Sampling depths for each location include 30', 40' and 50' below ground surface (BGS).

To show the existing monitoring well coverage that this sampling effort will supplement, existing monitoring wells at the site have been grouped by depth into four groups [Figure 6a through Figure 6d] and again into two groups [Figure 6e and Figure 6f] to show coverage by spatial locations and screen depths. These wells were plotted with the proposed transects in order to evaluate potential existing wells for permanent monitoring coverage across the transects. The need for and locations of additional permanent wells will be based on the geoprobe data and the locations of the existing wells, the goal being to end up with a transect of permanent monitoring points to assess the mass flux entering the CPS site over time.

The proposed location coordinates for sample points along the upgradient groundwater transect are tabulated in **Table 2**.

Table 2
Upgradient Geoprobe Transect Locations and Analytical Parameters (Three samples to be collected per boring location)

	New Jersey State Plane X Coordinate, NAD83, US survey feet	New Jersey State Plane Y Coordinate, NAD83, US survey feet	Targeted Sample Depths	Analytical Paramters
GP2007-1	540412.25	583695.38	30 ft., 40 ft., 50 ft.	VOC
GP2007-2	540487.51	583715.21	30 ft., 40 ft., 50 ft.	VOC
GP2007-3	540550.33	583732.72	30 ft., 40 ft., 50 ft.	VOC
GP2007-4	540619.05	583750.91	30 ft., 40 ft., 50 ft.	VOC
GP2007-5	540690.02	583768.94	30 ft., 40 ft., 50 ft.	VOC
GP2007-6	540763.91	583786.29	30 ft., 40 ft., 50 ft.	VOC

3.2.1 Upgradient Groundwater Sampling

As shown in Table 2, groundwater sampling will be conducted at 30, 40, and 50 foot depths, producing 3 vertical data points at each of the six locations shown in Figure 6. Samples will be collected for analysis by EPA Method 8260 at the target locations.

3.3 Downgradient Groundwater Transect

Figure 3 includes the location of the downgradient groundwater transect that will be used to better define the plume emanating from the CPS site, which is a combination of CPS/Madison sources and those upgradient of the site.

Ciba will use existing data where available and use additional proposed Geoprobe locations to fill in data gaps. Between 2004 and 2006 Ciba installed Geoprobe locations downgradient of the CPS source area. Figure 7 shows the locations, date and total depth BGS of these previous borings. In addition to these data, groundwater flow analysis, and comprehensive water quality data from existing monitoring wells and Geoprobe locations were used to map the VOC contaminant plume emanating from the CPS Site. Figure 8 shows the interpreted TVOC plume downgradient of the CPS source area. Based on the existing data, Figure 9 shows the proposed additional Geoprobe locations to fill the data gaps and achieve the objectives on this sampling plan.

Figure 9a through Figure 9f show the existing monitoring wells grouped in layers in the same manner as the wells in the vicinity of the upgradient groundwater sampling transect, to show the current coverage of the monitoring network. The proposed location coordinates for sample points along the downgradient groundwater transect are tabulated in Table 3.

3.3.1 Groundwater Sampling

The seven proposed locations for additional geoprobe groundwater sampling across the downgradient transect [Figure 9] will be sampled in the same manner as the upgradient transect, at depths of 15, 30, 40, and 50 feet below ground surface. Samples will be collected for analysis by EPA Method 8260 also analysis for the 8 RCRA metals at the target locations and depth intervals. At least five additional samples will be collected from locations within the downgradient groundwater transect for analysis by Method 8270.

Table 3

Downgradient Geoprobe Transect Locations and Analytical Parameters (Four samples to be collected per boring location)

Location ID		New Jersey State Plane Y Coordinate, NAD83, US survey feet	Targeted Sample Depths	Analytical Paramters
GP2007-7	539391.13	583069.75	15 ft., 30 ft., 40 ft., 50 ft.	VOC, metals
GP2007-8	539429.36		15 ft., 30 ft., 40 ft., 50 ft.	
GP2007-9	539462.57	582900.11	15 ft., 30 ft., 40 ft., 50 ft.	
GP2007-10	539494.82	582822.26	15 ft., 30 ft., 40 ft., 50 ft.	
GP2007-11	539524.70	582739.98		VOC, SVOC (TICs), Metals
GP2007-12	539558.58	582659.90	15 ft., 30 ft., 40 ft., 50 ft.	
GP2007-13	539592.78	582583.03		VOC, SVOC (TICs), Metals

3.4 Interim Site Use Assessment Shallow Soil Sampling

Six locations for sampling of shallow soils are proposed to assess any potential contaminant exposures that may reside in the large unpaved area to the east of the production area on the CPS site. This area was not used for production activities and was not previously investigated. Sampling is proposed as part of this plan to eliminate this area from further assessment and to support ongoing interim uses of the site. Figure 10 shows the proposed sampling locations for this effort. One sample is located in the paved parking lot area, and the remaining five sample locations are in the unpaved area of the site to the east.

Samples collected from these six locations will be analyzed for VOC [Method 8260], SVOC [Method 8270], and also analysis for the 8 RCRA metals. The location data and sample depths are shown in Table 4.

Table 4
Interim Site Use Assessment Sample Locations and Analytical Parameters (Two samples to be collected per boring location)

Location ID	New Jersey State Plane X Coordinate, NAD83, US survey feet	New Jersey State Plane Y Coordinate, NAD83, US survey feet	Targeted Sample Depths	Analytical Paramters
SS07-1	540478.43	583686.26	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals
SS07-2	540899.29	583823.81	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals
SS07-3	541433.79	584082.23	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals
SS07-4	541644.22	583181.92	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals
SS07-5	540987.67	583073.55	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals
SS07-6	541134.98	583461.18	0 to 1 ft.; 3 to 4 ft.	VOC, SVOC, Metals

4.0 Supplemental Remedial Investigation (SRI) Phase 1 Report

Within 60 days of receipt of the data from field sampling activities Ciba will prepare a Phase 1 SRI Report which will contain the following items.

- Present data and interpretations for groundwater and soil VOC, SVOC and metals contaminant distribution.
- Propose the locations of new monitoring wells and closure of existing, obsolete, wells.
- Propose upgrades, as necessary, to the existing CPS pump-and-treat system to meet capture and control criteria [i.e., define a revised interim remedy].
- Identify new data gaps made evident by the revised conceptual model for the Site.

Once a draft Phase 1 report has been submitted, a Phase 2 Work Plan will be submitted to USEPA. The focus for Phase 2 will be on characterizing the nature and extent of metals contamination associated with the CPS/Madison Site, characterizing the far-field groundwater VOC plume, and completing the HHRA. Metals [and far field VOC contamination] in groundwater, watercourse sediment and surface water will be addressed. In addition, any additional data gaps made apparent from Phase 1 activities will be addressed.

Tasks that are to be completed during Phase 2 include the following.

- 1. Conduct groundwater profiling using push technology to document the composition and horizontal and vertical extent of VOC and metals contamination at and downgradient of the Madison Site.
- 2. Current data indicate that significant stratigraphic layering exists at the Site, and that this layering affects the vertical flow of both water and of contaminants. Geophysical data will be collected in an attempt to identify and characterize these layers.
- 3. Conduct a groundwater/surface water interaction study along Pricketts Brook and Pond and Tennents Pond to document contaminant hydrology across the groundwater and surface water interface. Collect water quality, soil quality and hydraulic information to characterize groundwater discharge and recharge zones [reaches] and contaminant impact.
- 4. Prepare the updated HHRA for the site.

At the completion of the Phase 2 activities and receipt of the analytical data, Ciba will prepare a Supplemental Remedial Investigation Report and submit to USEPA. This report will present data

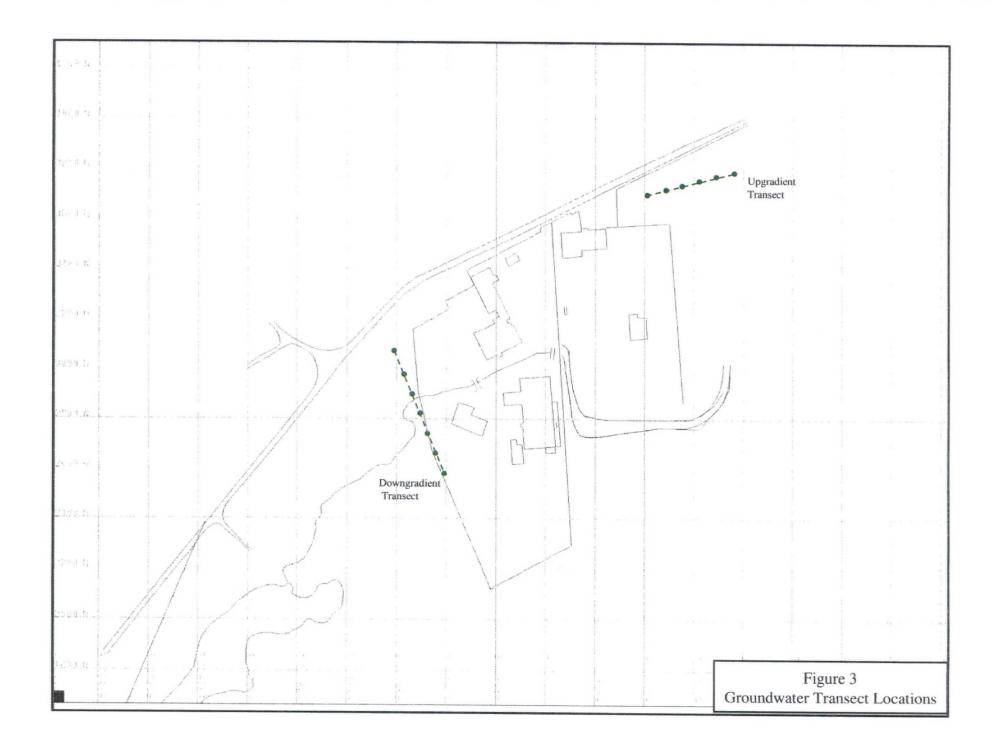
and interpretations for groundwater and soil VOC, SVOC and metals contaminant distribution. The data, presentation and discussion will be sufficient to meet the requirements of conducting remedial investigation under Superfund, and permit Ciba to move forward with the Feasibility Study for the Site.

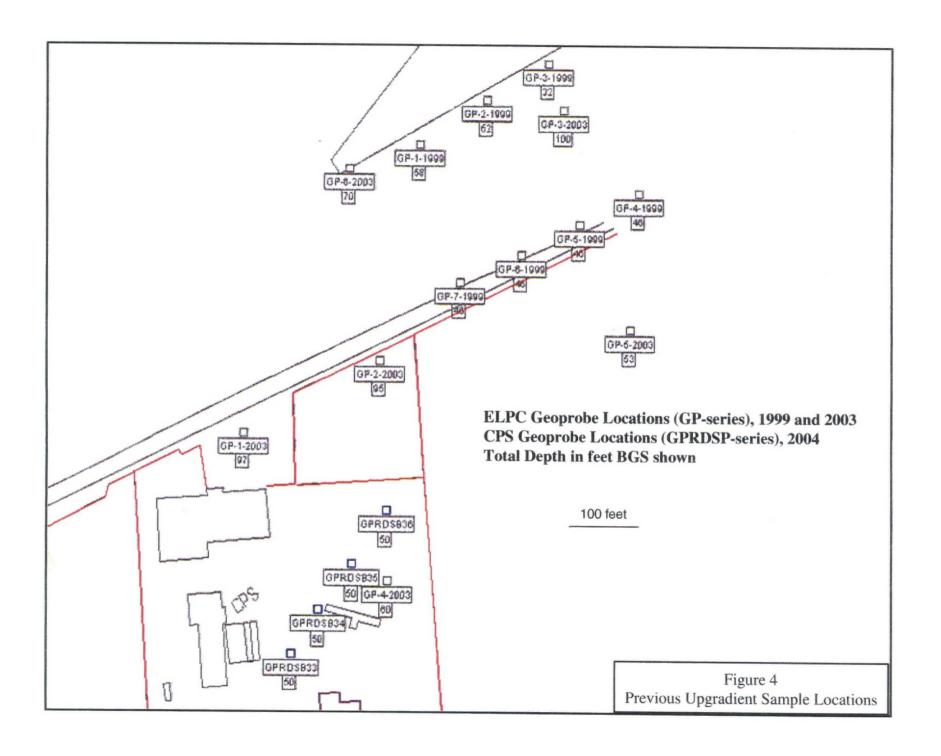
5.0 Schedule

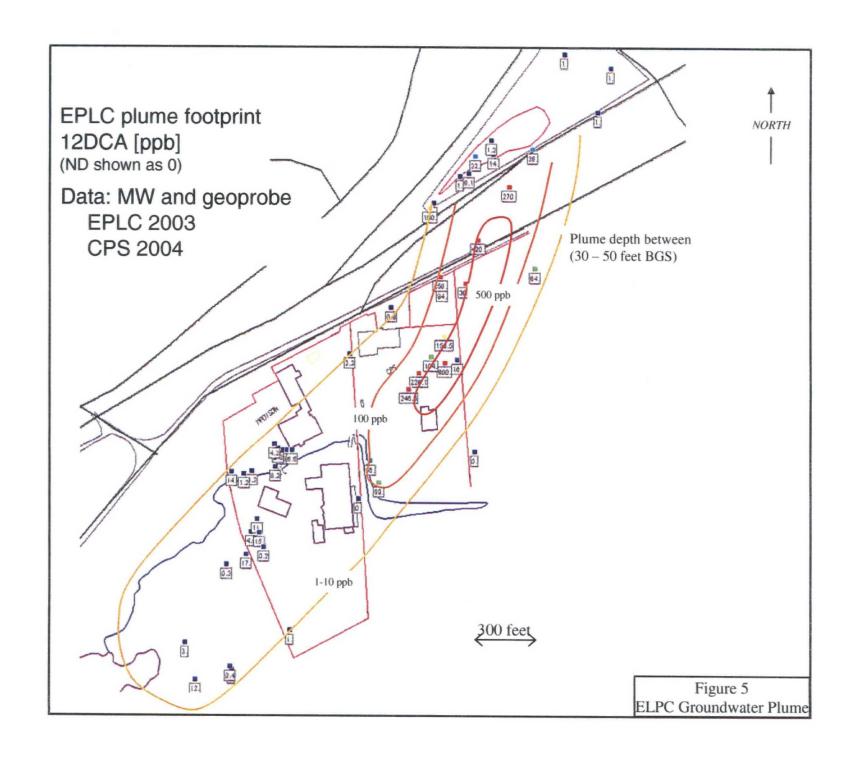
Figure 11 provides a task list and schedule for completing this first phase of the Supplemental Remedial Investigation.

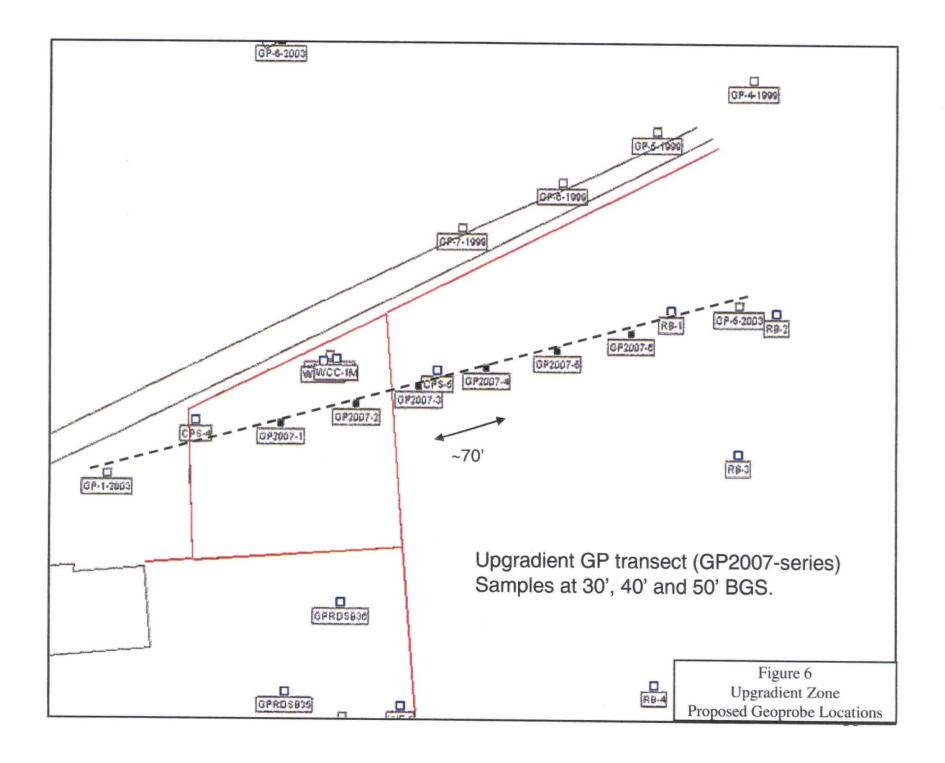


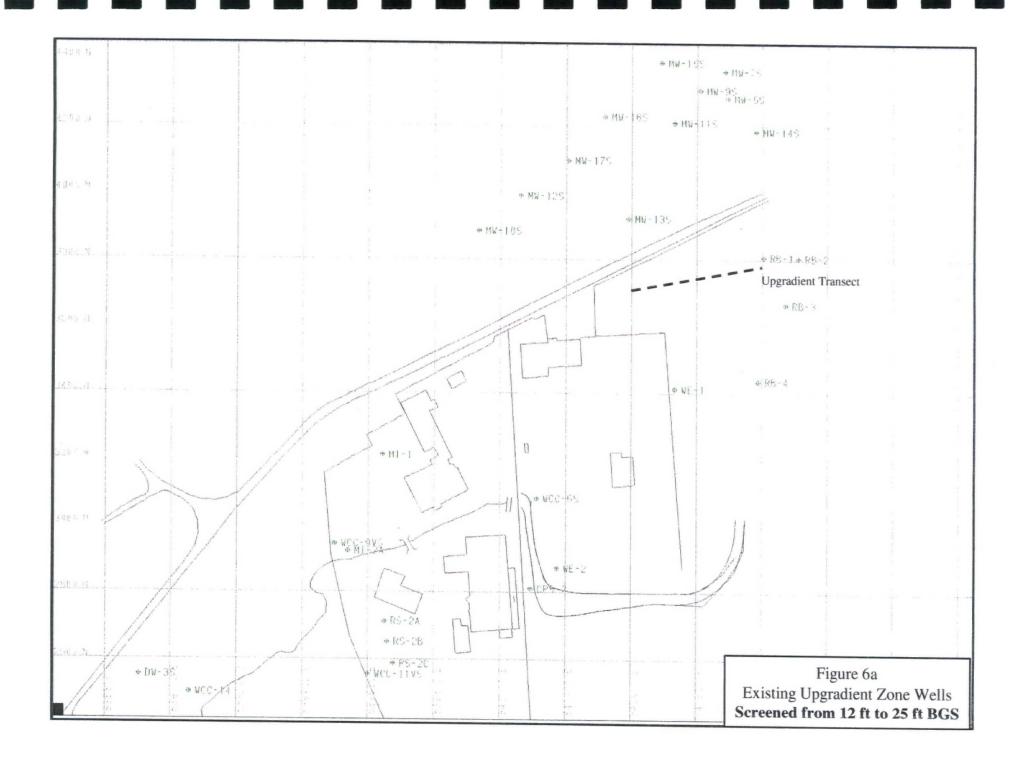


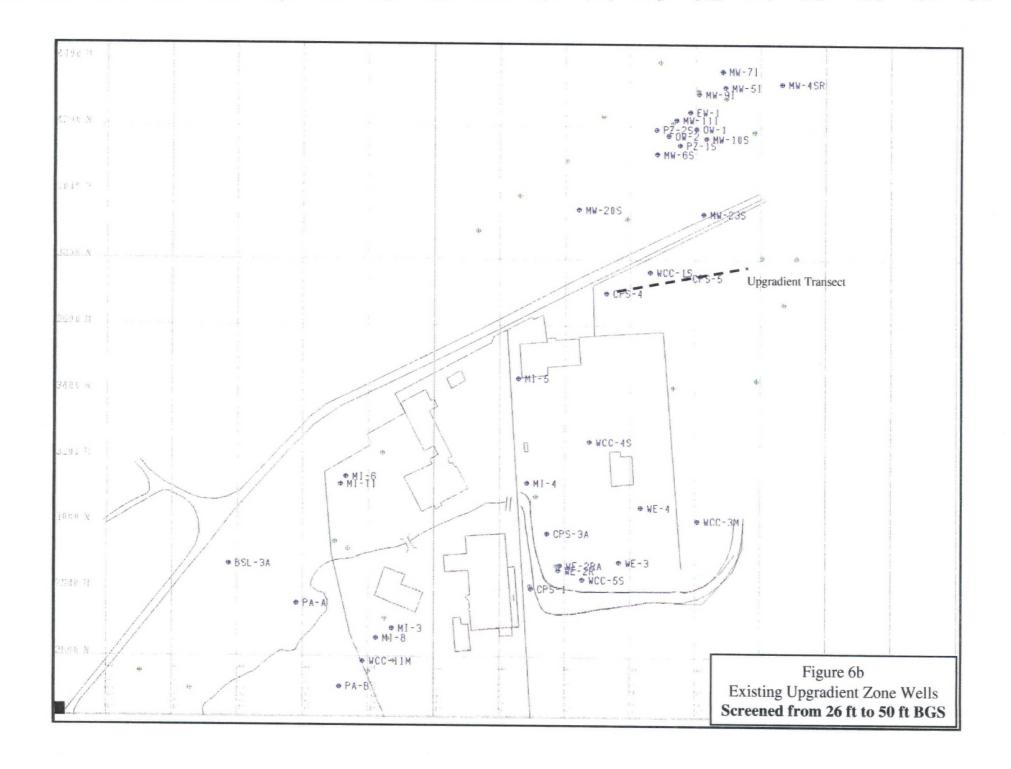


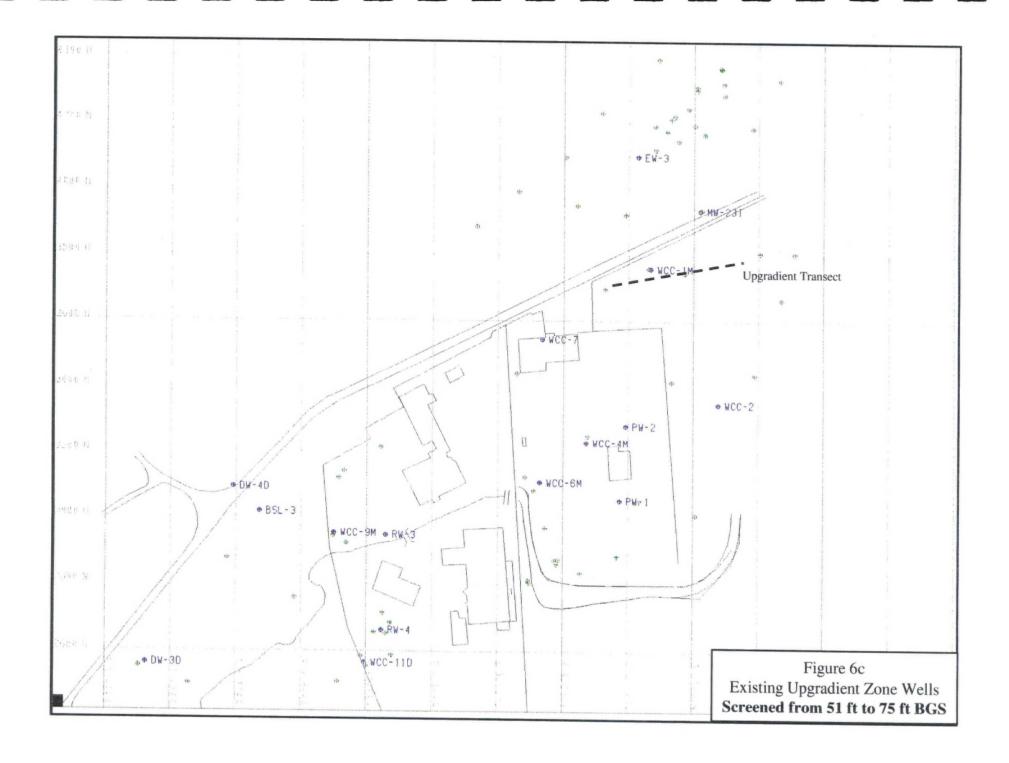


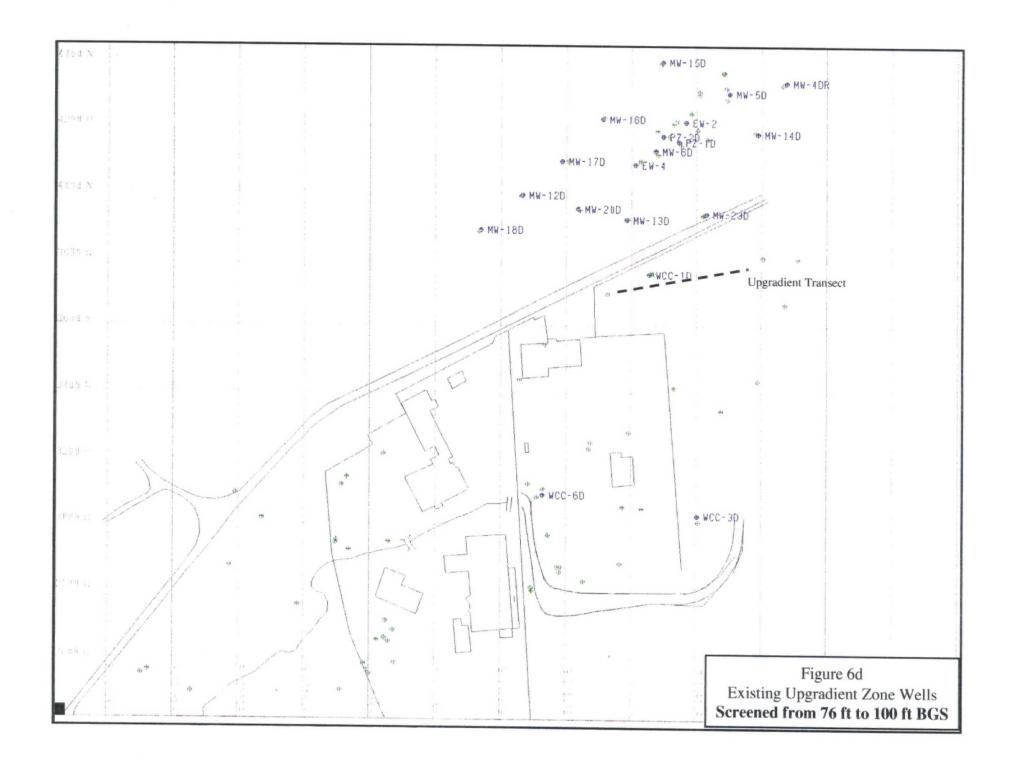


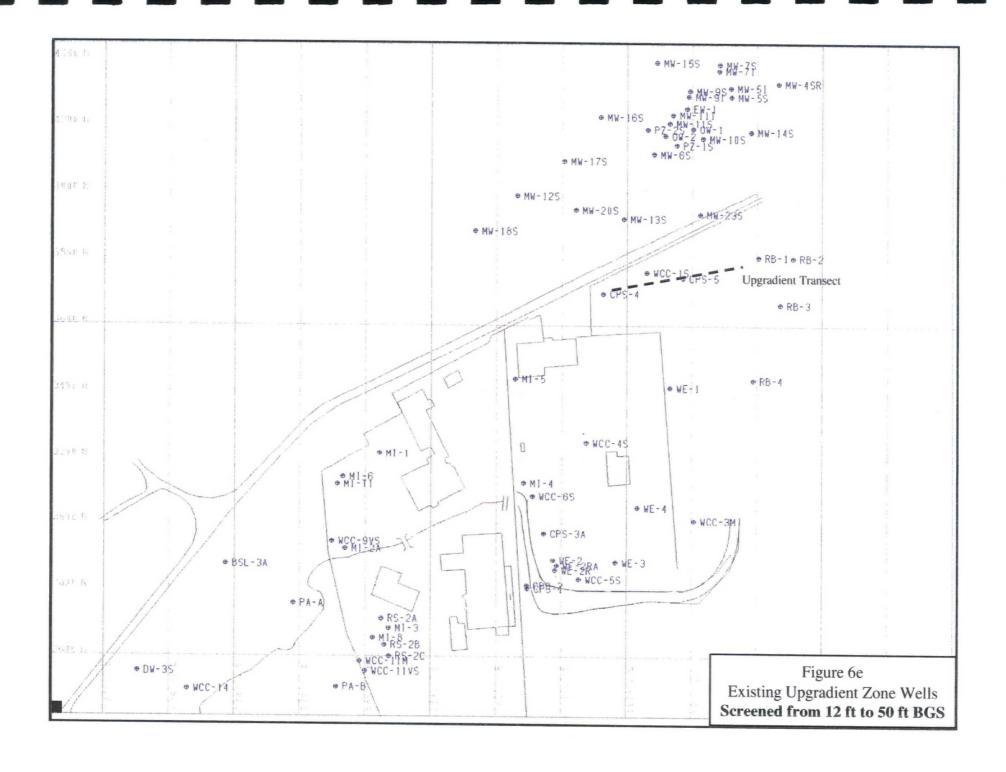


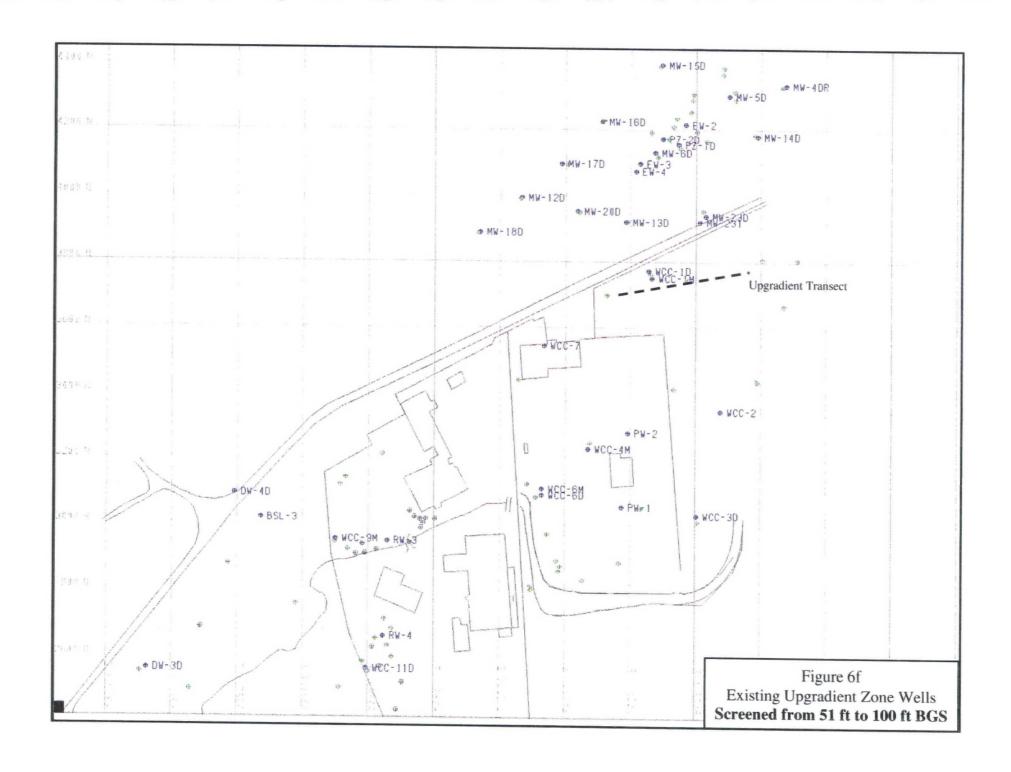


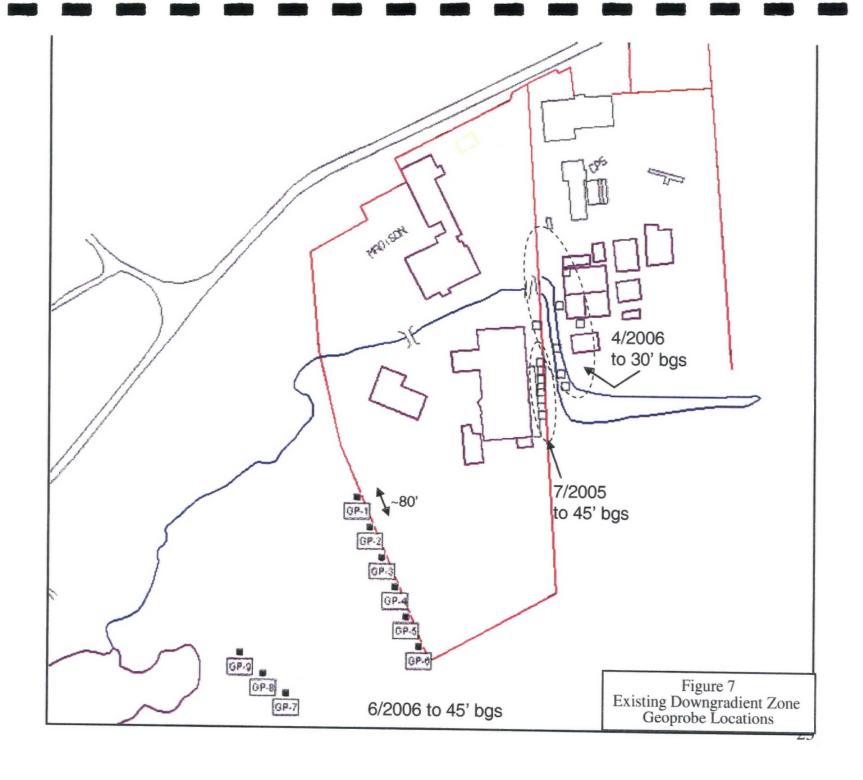


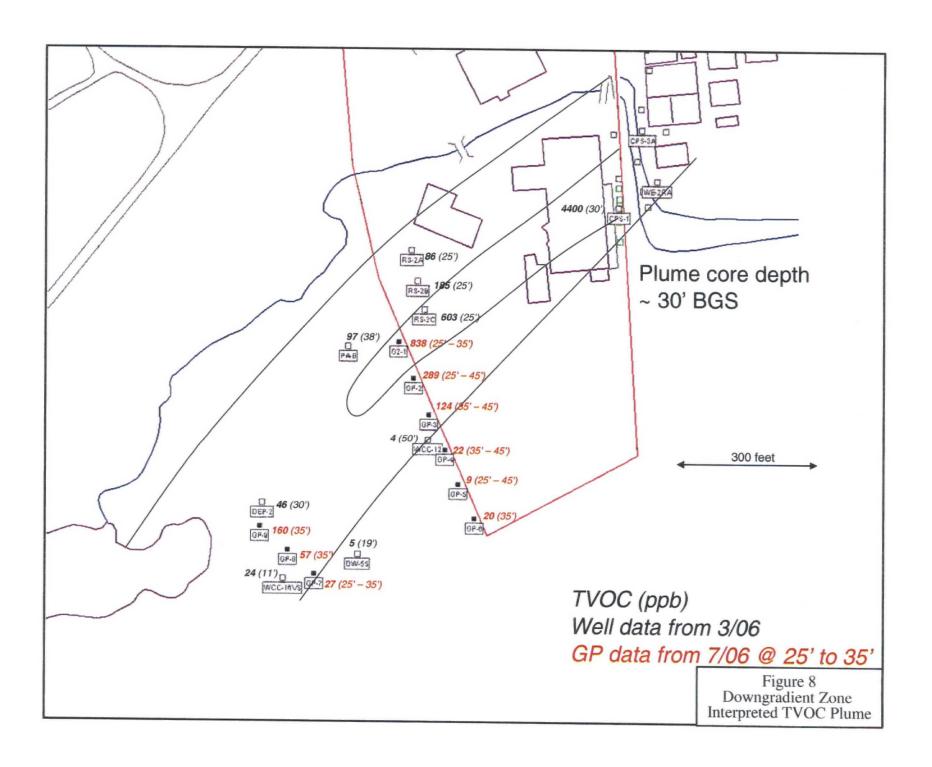


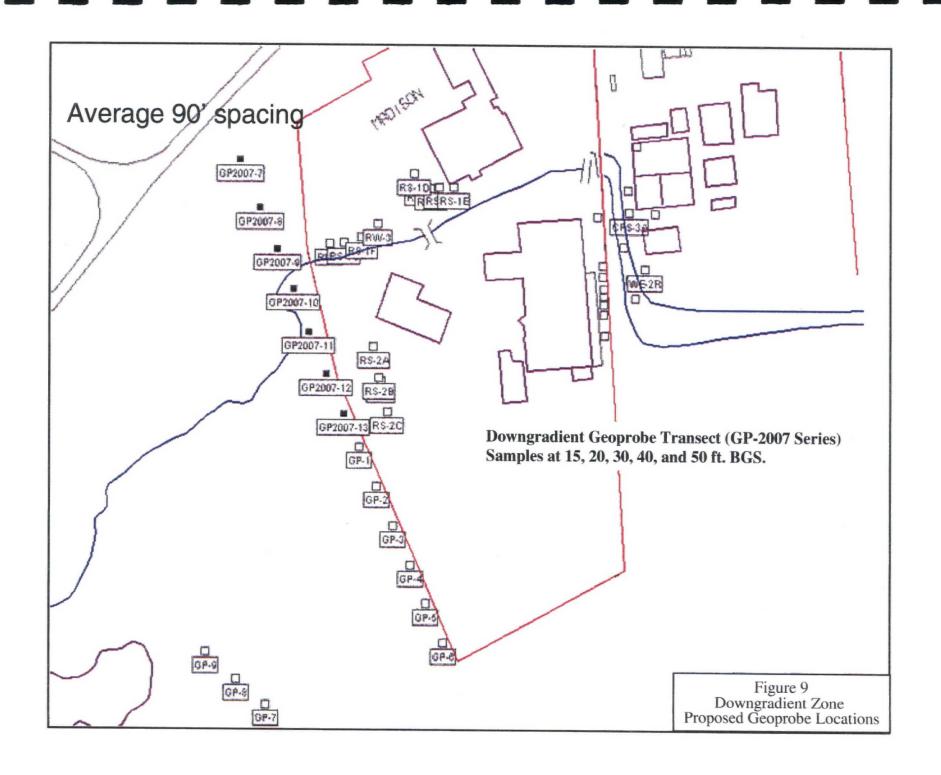


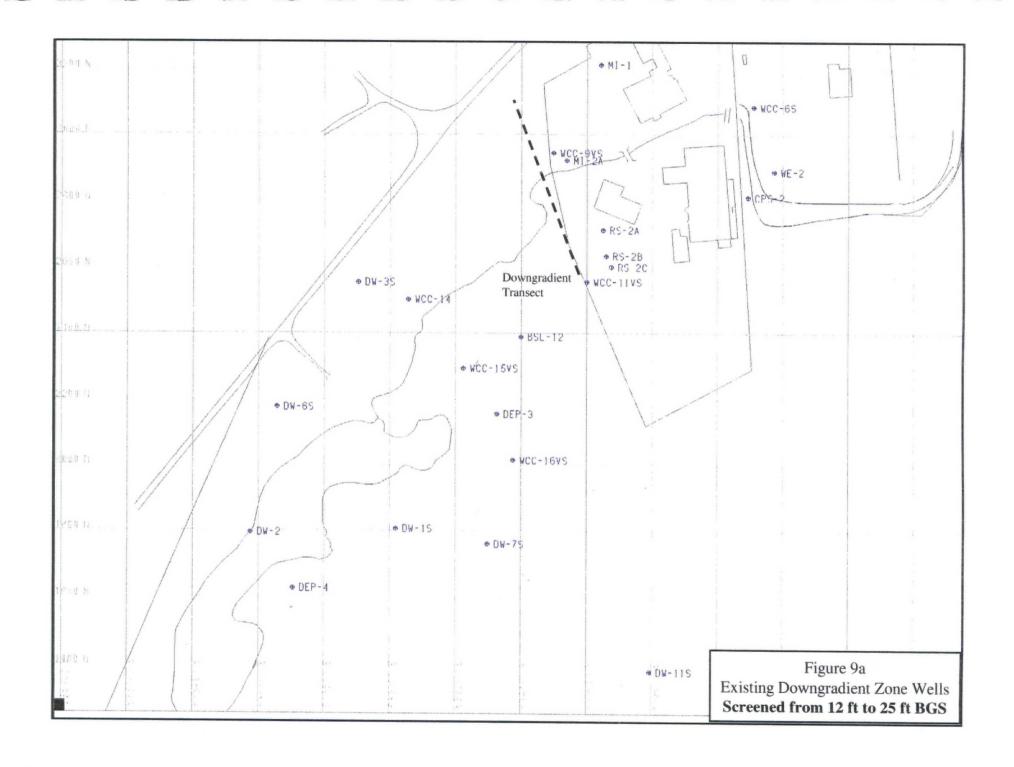


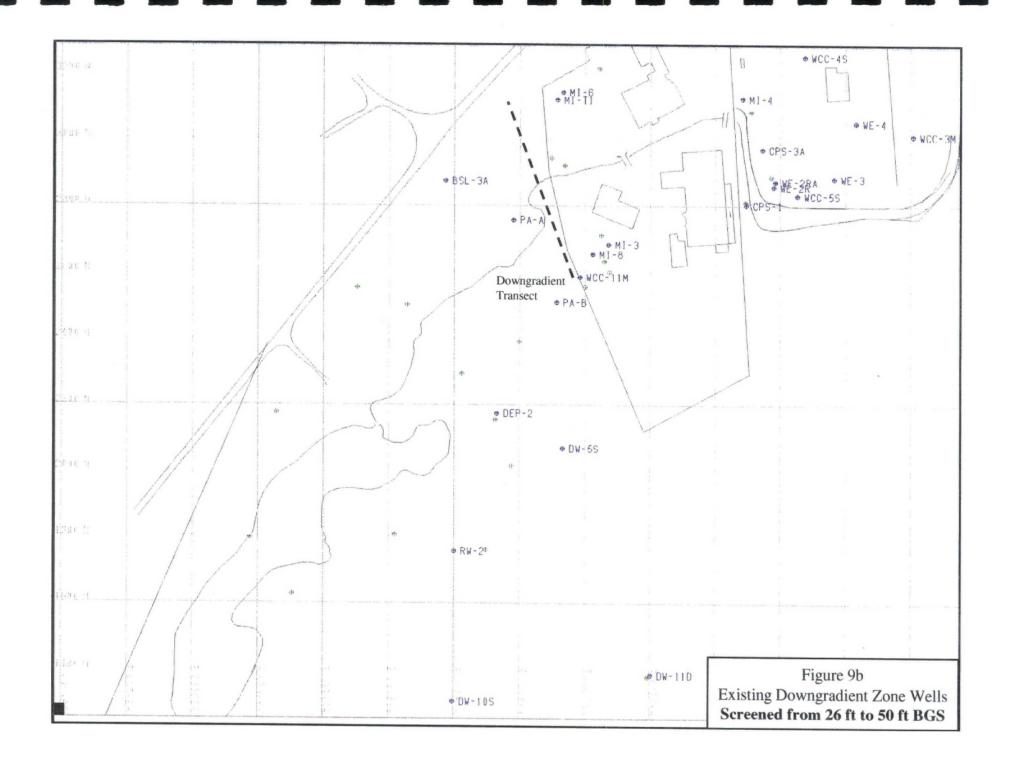


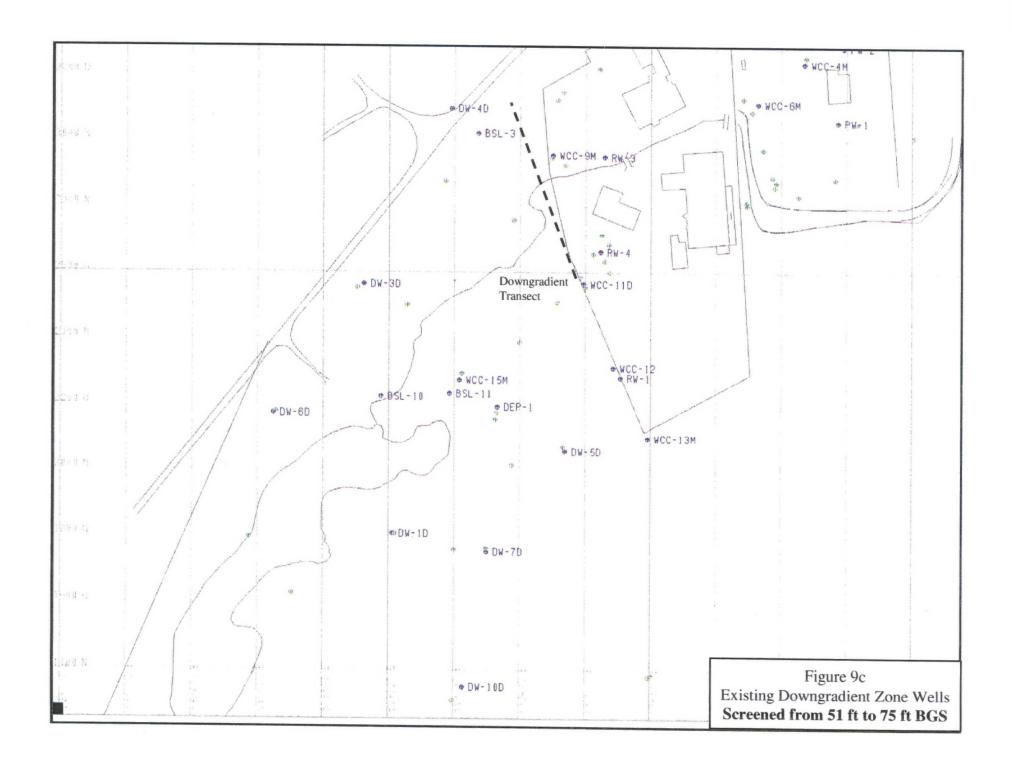


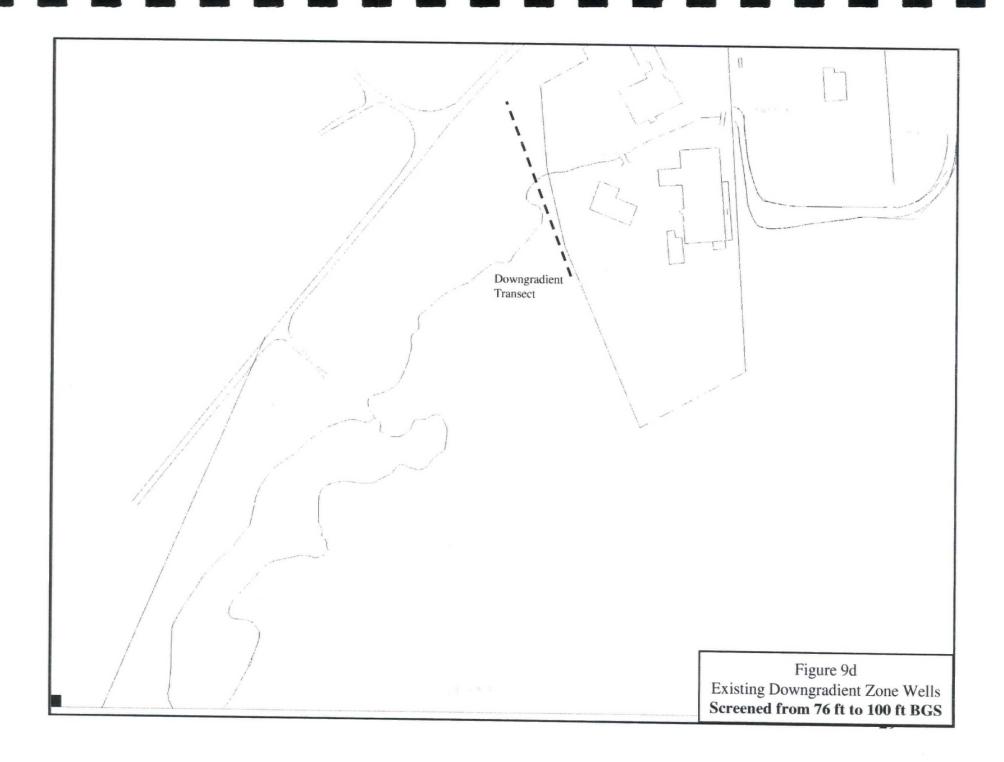


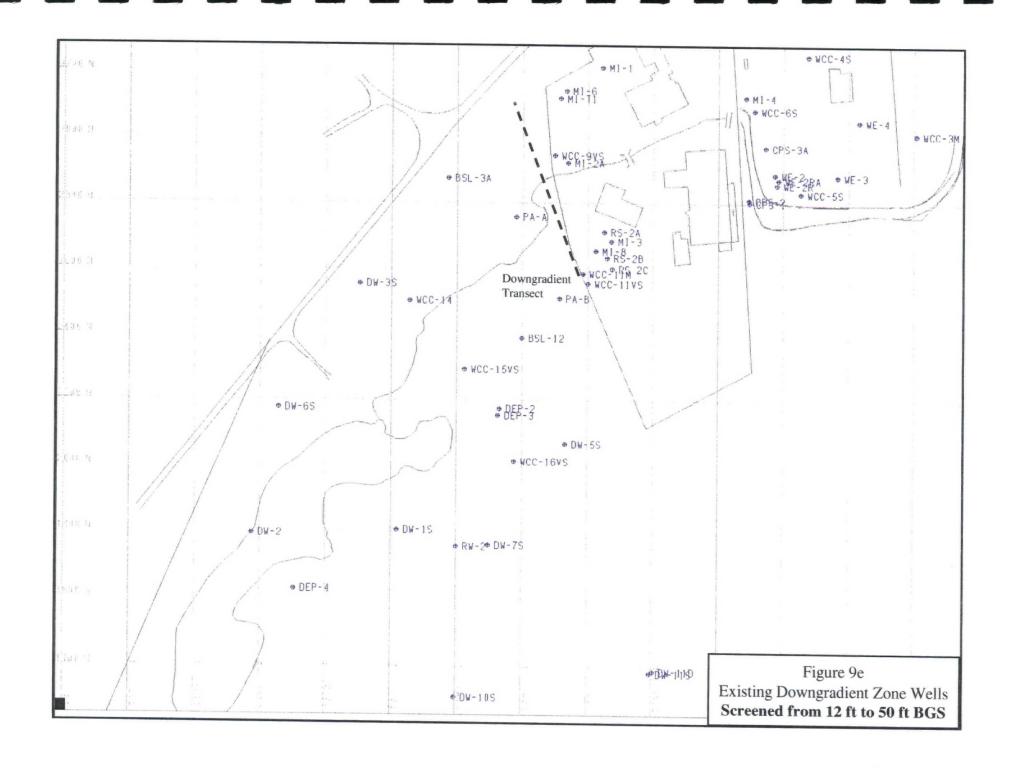


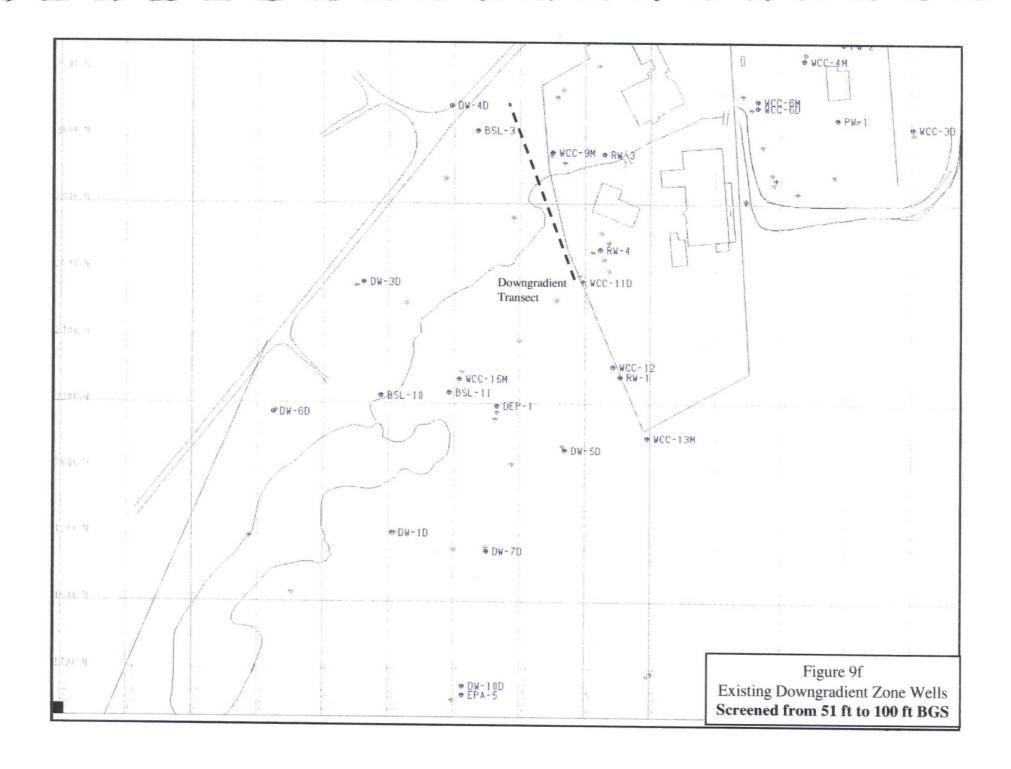


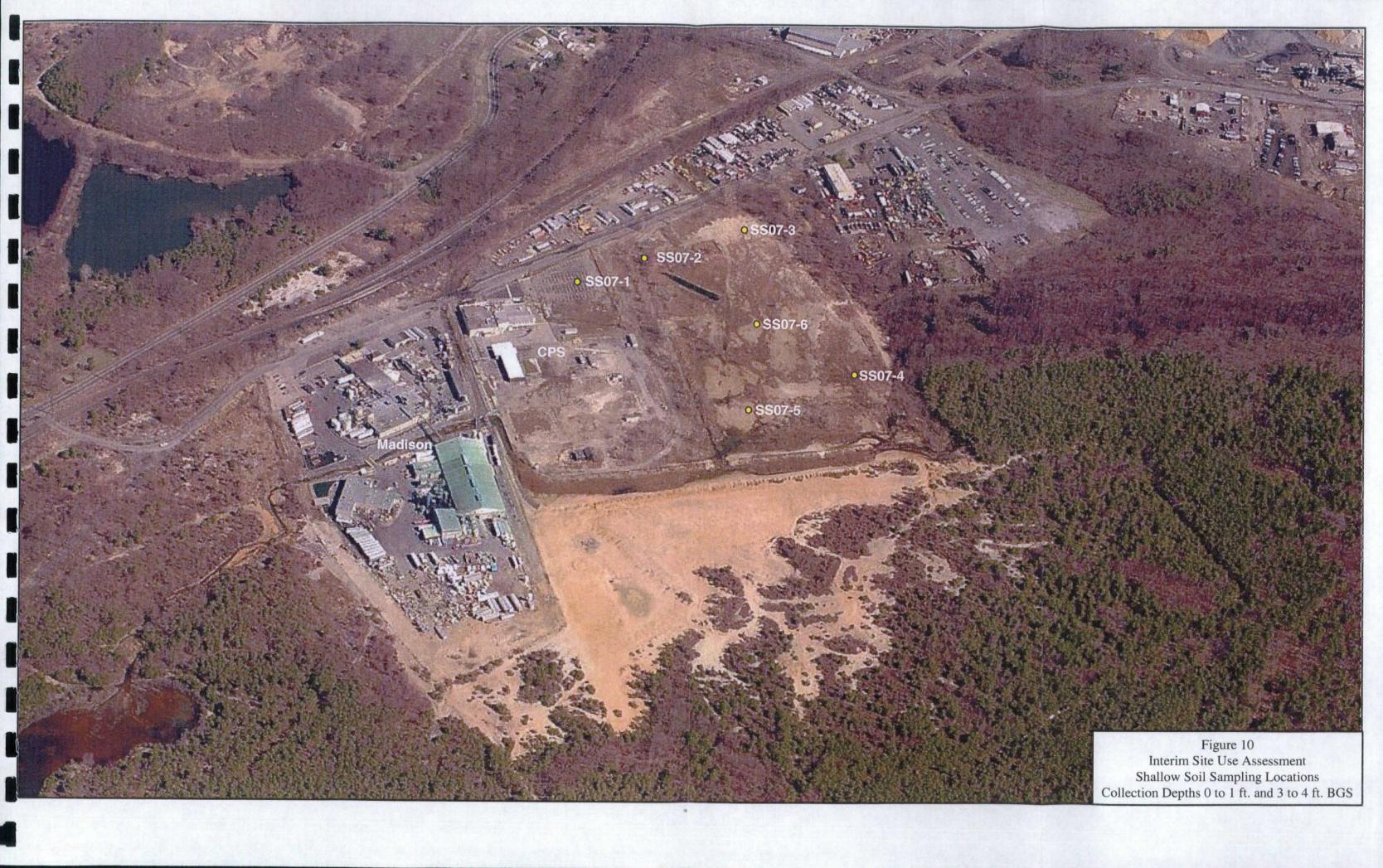












Submittal of Supplemental RI Work Plan (2-8-2007)

USEPA Review

Submittal of Draft Phase 1 Sampling Plan (5-18-07)

USEPA Review (30 Days)

Phase 1 Field Work and Sample Analysis (120 Days)

Submittal of Phase 1 Supplemental RI Report (9-30-07)

Phase 2 Schedule derived from Phase 1 Results

Figure 11
Tentative Implementation Schedule